Occupation and Prostate Cancer Risk in Sweden

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To provide new leads regarding occupational prostate cancer risk factors, we linked 36,269 prostate cancer cases reported to the Swedish National Cancer Registry during 1961 to 1979 with employment information from the 1960 National Census. Standardized incidence ratios for prostate cancer, within major (1-digit), general (2-digit), and specific (3-digit) industries and occupations, were calculated. Significant excess risks were seen for agriculture-related industries, soap and perfume manufacture, and leather processing industries. Significantly elevated standardized incidence ratios were also seen for the following occupations: farmers, leather workers, and white-collar occupations. Our results suggest that farmers; certain occupations and industries with exposures to cadmium, herbicides, and fertilizers; and men with low occupational physical activity levels have elevated prostate cancer risks. Further research is needed to confirm these findings and identify specific exposures related to excess risk in these occupations and industries.

Prostate cancer is the most common cancer among men in both Sweden and the United States.[1,2] In Sweden, about 25,000 new cases are diagnosed every year, accounting for 25% of all incident cases of cancer among men.[2] The age-adjusted incidence is 55.3 per 100,000 men.[2]

Excess risks of prostate cancer have been reported among various occupations, such as metal workers; machine operators and repairmen; plumbers; coal miners; paper, chemical, wood, cadmium, rubber, and tobacco industry workers; bookkeepers; professionals; executives; and teachers.[3–12] Prostate cancer risk among farmers and other agriculture workers has been evaluated in approximately 40 studies in the United States and Europe, and recent meta-analyses of these studies report significantly elevated prostate cancer risks of 7% to 12%.[13,14]

To provide new leads regarding occupational risk, we linked prostate cancer incidence data for all of Sweden between 1961 and 1979 with employment information reported in the 1960 National Census.

Materials and Methods

Details of the methods have been reported elsewhere.[15–17] Briefly, we used the Swedish Cancer-Environment Registry—which links information on current employment at the time of the 1960 National Census with cancer incidence data from the National Swedish Cancer Registry for the period 1961 to 1979—to identify the occupations and industries of Swedish citizens with prostate cancer.[15] This linkage between

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data sources is possible owing to the unique 10-digit personal identification number assigned to every Swedish citizen. In addition, Swedish national law requires that all malignant tumors be reported to the National Cancer Registry; thus, ascertainment of prostate cancer is essentially complete.[16]

Standardized incidence ratios (SIRs) were used to estimate prostate cancer risk for various occupational and industrial categories in Sweden for the 19-year follow-up period. The SIR is the ratio of observed to expected prostate cancer cases in a particular industrial or occupational category. The expected number of cases was generated by applying the 5-year birth-cohort rates for prostate cancer in the general Swedish male population during 1961 to 1979 to the number of men in the same 5-year birth-cohort for each employment category. SIRs were calculated for all major (1-digit), general (2-digit), and specific (3-digit) industrial and occupational groups. Industries or occupations with fewer than five cases of prostate cancer were not included in this analysis. Owing to geographical variation in prostate cancer incidence in Sweden, all SIRs were adjusted for region. Statistical significance was tested under the assumption that the observed number of prostate cancer cases followed a Poisson distribution.[18] All P values were based on two-sided tests.

Results

A total of 39,422 men employed in 1960 developed prostate cancer during 19 years of follow-up. About 92% of these cases had microscopically confirmed disease, and 99.6% of these cancers were adenocarcinomas. Only cases with microscopically confirmed prostate cancer (n = 36,269) were used in this analysis.

Table 1 shows SIRs for the major (1-digit) industries. Small but significant increases in risk, ranging from 3% to 7% greater than expected, were observed for men employed in several major industries, including agriculture, manufacturing, construction, business, transportation and communication, and service.

TABLE 1
Standardized Incidence Ratios (SIRs) for Prostate Cancer Among Swedish Men by Major Industry, 1961–1979

Code	Major Industry	Observed	SIR[a]	95% CI
0	Agriculture[b]	7,955	1.05**	1.03–1.07
1	Mining and quarrying	257	0.95	0.83–1.07
2	Manufacturing I[c]	4,814	1.04**	1.01–1.07
3	Manufacturing II[d]	6,508	1.03*	1.00–1.05
4	Construction	4,355	1.05**	1.02–1.08
5	Municipal services	495	1.06	0.97–1.16
6	Business[e]	3,426	1.05**	1.01–1.08
7	Transportation and communication	2,316	1.07**	1.03–1.12
8	Services[f]	3,280	1.05**	1.01–1.08

[a] Adjusted for age and region.
[b] Includes farming, forestry, fishing, and hunting industries.
[c] Includes food, beverage and tobacco, textile, garment, lumber, furniture and furnishing, paper, graphic and publishing, leather, and rubber industries.
[d] Includes chemical, coal and petroleum, earth and stone, metal, machine and electronics, transportation vehicles, and miscellaneous fabrication industries.
[e] Includes industries of trade, finance, insurance, and real estate.
[f] Includes industries of government, health care, professional and commercial agencies, hotels and restaurants, and other services.
* $P < 0.05$.
** $P < 0.01$.

TABLE 2
Standardized Incidence Ratios (SIRs) for Prostate Cancer Among Swedish Men by Major Occupation, 1961–1979

Code	Major Occupation	Observed	SIR[a]	95% CI
0	Professional and technical	3,439	1.08**	1.04–1.11
1	Administrative and management	1,502	1.18**	1.12–1.24
2	Clerical workers	1,346	1.09**	1.04–1.15
3	Sales	2,220	1.05**	1.01–1.10
4	Farmers, fisherman and hunter	7,826	1.04**	1.02–1.10
5	Miners and quarrymen	177	0.91	0.78–1.05
6	Transport and communication workers	2,086	1.06**	1.02–1.11
7	Craftsmen and production I[b]	8,613	1.01	0.99–1.03
8	Craftsmen and production II[c]	4,800	1.03*	1.00–1.06
9	Services and recreational[d]	1,477	1.04	0.99–1.09

[a] Adjusted for age and region.
[b] Includes textile, foundry, metal, fine mechanical, electrical, painting and lacquering, and masonry and concrete work.
[c] Includes graphic, glass, porcelain, ceramic and tile, food-related, chemical and cellulose industries, tobacco, heavy and miscellaneous labors, and warehouse and supply room work.
[d] Includes government, domestic, restaurant, coaching, and other services.
* $P < 0.05$.
** $P < 0.01$.

Table 2 shows SIRs for major (1-digit) occupational categories. Among the major occupational groups, small excesses, ranging from 3% to 18%, were found for white-collar workers (including professional and technical workers, administrative and management workers, clerical workers, and sales workers); farmers, fishermen, and hunters; transportation and communication workers; and one of two sets of craftsmen and production workers. In contrast, a nonsignificant decreased risk was found for miners and quarrymen (SIR = 0.91).

Table 3 shows SIRs for general (2-digit) and specific (3-digit) indus-

TABLE 3
Standardized Incidence Ratios (SIRs) for Prostate Cancer Among Swedish Men by General (2-Digit) and Specific (3-Digit) Industries, 1961–1979

Code	General Industry	Observed	SIR[a]	95% CI	Code	Specific Industry	Observed	SIR[a]	95% CI
01	Agriculture	6,615	1.05*	1.03–1.08	010	Actual agriculture and stock raising	6,080	1.07**	1.02–1.08
					013	Fur-bearing animal breeding	28	1.35	0.90–1.96
					014	Other animal breeding	34	1.05	0.73–1.47
					015	Veterinary medicine	24	1.98**	1.27–2.94
02	Forestry	1,189	1.05**	1.00–1.11	020	Forest management	143	1.34**	1.13–1.58
					021	Logging	948	1.03	0.96–1.10
03	Fishing	151	0.94	0.80–1.10					
10	Mining and ore processing	257	0.95	0.83–1.07	100	Coal mining	11	0.92	0.46–1.64
20	Food processing	847	1.06	0.99–1.13	200	Butcher shops and meat processing	207	1.13*	1.00–1.30
					201	Dairies	117	1.16	0.96–1.39
					202	Fruit and vegetable processing	26	1.19	0.77–1.74
21	Beverage and tobacco	162	1.11	0.94–1.29	211	Breweries and malt processing	112	1.12	0.92–1.34
					212	Soft drink and mineral water plants	23	1.24	0.79–1.86
					213	Tobacco	15	1.54	0.86–2.54
26	Paper	855	1.05	0.98–1.12	260	Pulp grinding	39	1.36*	0.97–1.86
					261	Cellulose	386	1.24**	1.12–1.37
					262	Paper mills	304	0.86	0.77–0.96
28	Leather	82	1.18**	1.00–1.48	280	Tanneries and leather processing	45	1.58**	1.15–2.11
					281	Skin processing	11	1.48	0.74–2.65
30	Rubber	118	1.00	0.94–1.10	300	Rubber goods	90	0.94	0.75–1.15
31	Chemical	366	1.00	0.94–1.10	316	Soap and perfume	55	1.46**	1.10–1.89
33	Earth and stones	655	1.06	0.98–1.14	334	Cement and light concrete	142	1.03	0.87–1.21
					335	Paving and stone cutting	97	1.11	0.90–1.36
					336	Lime and chalk	47	1.48**	1.08–1.96
					337	Peat and peat litter	21	1.32	0.82–2.03
34	Metal	1,685	1.01	0.96–1.06	340	Iron and steel plants	480	1.17*	1.00–1.01
					341	Pig iron and steel foundries	140	1.23*	1.00–1.40
36	Transport vehicle construction	1,238	1.06	1.00–1.12	364	Automotive repair	349	1.12*	1.00–1.24
40	Home building	2,423	1.07*	1.02–1.11	400	Home construction	2,423	1.07**	1.03–1.11
67	Banking and insurance	374	1.14*	1.03–1.26	670	National Bank of Sweden	122	1.1	0.91–1.31
					671	Savings banks	43	1.21	0.88–1.63
					672	Credit institutions	26	1.1	0.72–1.61
					673	Insurance	158	1.13	0.96–1.31
70	Transport	1,653	1.07*	1.02–1.12	700	Railroad traffic	517	1.12**	1.02–1.22
					802	Legal services	77	1.49**	1.17–1.86
81	Education	580	1.11**	1.02–1.20	810	Universities	53	1.04	0.78–1.35
					811	Secondary grammar schoolteaching	125	1.1	0.91–1.31
					812	Elementary schoolteaching	304	1.15**	1.02–1.29

[a] Adjusted for age and region.
* $P < 0.05$.
** $P < 0.01$.

TABLE 4

Standardized Incidence Ratios (SIRs) for Prostate Cancer Among Swedish Men by General (2-Digit) and Specific (3-Digit) Occupations, 1961–1979

Code	General Occupation	Observed	SIR[a]	95% CI	Code	Specific Occupation	Observed	SIR[a]	95% CI
00	Technical work	1,916	1.09**	1.04–1.14	001	Architects and construction engineers	465	1.11**	1.02–1.22
					002	Electrical engineers	241	1.10	0.96–1.24
					003	Mechanical engineers	593	1.08*	1.00–1.17
					005	Mining engineers	87	1.19	0.96–1.47
					006	Technical field engineers	288	1.08	0.96–1.22
					007	Surveyors	28	1.34	0.89–1.94
					008	Technical assistants	51	1.12	0.83–1.47
02	Biology work	71	1.35**	1.05–1.69	021	Veterinarians	19	1.60*	1.00–2.50
					023	Agricultural researchers	34	1.36*	1.00–1.90
					024	Forestry researchers	17	1.30	0.75–2.08
05	Education	458	1.07	0.97–1.17	050	School teachers	70	1.26*	1.00–1.59
08	Literary and artistic work	239	1.05	0.92–1.19	082	Designers	18	1.56*	1.00–2.46
					083	Decorators	9	1.20	0.55–2.27
					084	Writers	16	1.15	0.65–1.86
					087	Musicians	47	1.50**	1.10–2.00
11	Business executive	1,347	1.19**	1.13–1.26	111	Business executives	956	1.22**	1.14–1.30
					118	Other business administrators	391	1.12*	1.01–1.24
20	Bookkeeping and cashier work	333	1.14	1.02–1.27	201	Office cashier bookkeepers	307	1.14*	1.02–1.23
29	Stenography and typing	1,013	1.08**	1.01–1.15	290	Secretaries	45	1.17	0.85–1.56
					292	Bank clerks	44	1.10	0.80–1.48
					294	Dispatchers, shipping agents	74	1.26*	1.00–1.58
					295	Real estate administrators	386	1.10*	1.00–1.21
					296	Insurance clerks	35	1.17	0.82–1.63
32	Salesperson	338	1.18**	1.06–1.31	321	Traveling sales professionals	338	1.18**	1.05–1.31
40	Agriculture, forest, garden, and park management	5,511	1.08**	1.05–1.11	401	Farmers, foresters, and gardeners	5,219	1.07**	1.04–1.10
					402	Agricultural law enforcement	34	1.30	0.90–1.82
					403	Forest law enforcement	161	1.33**	1.13–1.55
					404	Park law enforcement	41	0.92	0.66–1.25
					405	Pet breeders	28	1.15	0.77–1.67
					406	Breeders of fur-bearing animals	25	1.75**	1.13–2.50
41	Agriculture, horticulture, and animal management	1,249	0.96	0.91–1.01	413	Pet keepers	107	0.90	0.74–1.09
					414	Keepers of fur-bearing animals	4	0.76	0.21–1.96
50	Mining and quarrying	177	0.91	0.78–1.05	501	Quarry workers and rock blasters	120	0.90	0.75–1.08
					502	Well drillers	20	1.48	0.91–2.29
					503	Ore sorters	12	0.66	0.34–1.16
60	Ship's officers	138	1.17**	1.00–1.38	601	Nautical law enforcement	98	1.32**	1.07–1.61
64	Traffic administration	151	1.23**	1.04–1.44	643	Railroad traffic enforcement officers	66	1.39**	1.08–1.77
65	Post office and telecommunication	76	1.11	0.88–1.40	651	Post office assistants	40	0.86	0.62–1.17
					652	Telephone assistants	9	1.54	0.70–2.92
					653	Telephone operators	15	1.84*	1.03–3.04
					654	Switchboard operators	5	1.93	0.62–1.17

TABLE 4—CONTINUED

Standardized Incidence Ratios (SIRs) for Prostate Cancer Among Swedish Men by General (2-Digit) and Specific (3-Digit) Occupations, 1961–1979

Code	General Occupation	Observed	SIR[a]	95% CI	Code	Specific Occupation	Observed	SIR[a]	95% CI
66	Postal and other messenger work	317	1.02	0.91–1.14	661	Postal deliverymen	134	1.09	0.91–1.29
75	Shop and construction metal	2,356	0.98	0.94–1.02	750	Toolmakers and machinists	658	0.95	0.87–1.02
					752	Mechanics	573	1.05	0.96–1.13
					753	Light sheet metal workers	160	0.99	0.84–1.15
					755	Welders, metal cutters	166	1.07	0.92–1.25
					756	Heavy sheet metal workers	137	0.98	0.82–1.15
					757	Metal platers	27	0.96	0.63–1.39
77	Woodworking	2,190	1.04*	1.00–1.08	771	Carpenters	1,115	1.10**	1.04–1.17
82	Food-related work	533	1.03	0.95–1.12	825	Food processors	26	1.30	0.85–1.90
					826	Butchers, meat packers	123	1.07	0.89–1.27
					827	Dairy workers	55	1.01	0.76–1.31
83	Chemical acid cellulose	533	1.06	0.97–1.15	831	Chemical workers	127	1.08	0.90–1.29
					834	Pulp grinders, cellulose workers	152	1.13	0.96–1.33
					838	Other workers in chemical and cellulose industry	28	1.16	0.77–1.68
84	Tobacco	6	3.00**	1.09–6.53	841	Tobacco workers	6	3.58**	1.30–7.77
85	Other fabrication work	362	1.04	0.94–1.15	851	Rubber workers	47	0.86	0.63–1.15
					853	Tanners and skin processors	38	1.50**	1.06–2.05
					855	Musical instrument makers	12	1.14	0.59–2.00
					856	Stone cutters	69	0.92	0.72–1.17
					857	Paper and packaging workers	30	1.22	0.83–1.75
87	Machine and motor maintenance	627	1.04	0.96–1.12	871	Farm machine operators	206	1.06	0.92–1.22
					872	Crane operators	97	1.09	0.88–1.33
					653	Telephone operators	15	1.84*	1.03–3.04
					654	Switchboard operators	5	1.93	0.62–1.17

[a] Adjusted for age and region.

* $P < 0.05$.

** $P < 0.01$.

trial categories. The general industries of agriculture, forestry, leather, homebuilding, banking and insurance, transport, and education had small but significantly elevated SIRs. Although elevated risks were found for all specific industries in agriculture and forestry, only those for actual agriculture/stock raising, veterinary medicine, and forest management were significantly elevated.

We found significant small excess risks of prostate cancer for a few specific industries of a priori interest: butcher shops and meat processing (SIR = 1.13; 207 cases), pulp grinding (SIR = 1.36; 39 cases), and automotive repair (SIR = 1.12; 349 cases) (Table 3). We did not, however, observe elevated risks among the following specific industries for which increased risks of prostate cancer had previously been reported: coal mining (SIR = 0.92; 11 cases) and rubber goods (SIR = 0.94; 90 cases).

Small but significantly elevated risks were seen for the industries of cellulose manufacturing (SIR = 1.24), tanneries/leather processing (SIR = 1.58), soap and perfume manufacture (SIR = 1.46), lime and chalk production (SIR = 1.48), iron and steel plants (SIR = 1.17), pig iron and steel foundries (SIR = 1.23), home construction (SIR = 1.07), railroad traffic (SIR = 1.12), legal services (SIR = 1.49), and elementary schoolteaching (SIR = 1.15).

Table 4 shows that risks of prostate cancer were significantly elevated among the general occupations of technical workers, biologists, business executives, stenographers and typists, salespeople, ship's officers, traffic administrators, woodworkers, and tobacconists. For specific occupations, elevated risks of prostate cancer were found for all technical occupations, although only those for architects and construction engineers and for mechanical engineers were significantly elevated. Significantly elevated risks were also seen for certain white-collar occupations, including school teachers, designers, musicians, other business administrators, cashiers and bookkeepers, dispatchers and shipping agents, real estate administrators, traveling salesmen, and telephone operators.

In addition, risk was elevated among most biology work occupations, as well as most agriculture, forest, garden, and park management occupations, although only for the categories of veterinarians (SIR = 1.60, 19 cases); agriculture researchers (SIR = 1.36, 34 cases); farmers, foresters, and gardeners (SIR = 1.07; 5,219 cases); forest law enforcement (SIR = 1.33; 161 cases); and breeders of fur-bearing animals (SIR = 1.75; 25 cases) were the increases significant. Other specific occupations with significantly elevated SIRs include nautical law enforcement officers, carpenters, and tanners and skin processors.

We found nonsignificant small decreased risks of prostate cancer in several occupations that have been reported previously to have increased risks of prostate cancer and possible exposure to cadmium dust: mining and quarry workers, shop and construction metal workers (including sheet metal workers, platers, and machinists), and rubber workers.

Discussion

In this hypothesis-generating investigation, consistent with previous studies, we found excess risks of prostate cancer among the agriculture, sales, tobacco, clerical, and mechanical industries. As a result of multiple comparisons, some findings may be the result of chance, whereas others may present new leads to occupational determinants of prostate cancer.

Findings that may be considered new leads include the excess risks seen in the industries of pig iron and steel foundries, soap and perfume manufacture, butchers and meat processors, lime and chalk production, pulp grinding and cellulose manufacture, leather tanning, veterinary medicine, forest management workers, and breeders of fur-bearing animals.

The excess risk among pig iron workers may be related to a variety of potential carcinogens, including polycyclic aromatic hydrocarbons, metal dust (especially cadmium dust), and cutting fluids, which have been linked to excess prostate cancer risk among steel foundry, engine plant, and maintenance craft workers.[19–22]

The elevated risk seen for soap and perfume workers warrants further investigation, as excess risks of cancers of the male breast, bladder, and liver have been reported previously among these workers.[17,23,24] Exposures to carcinogenic reagents, solvents, and other chemicals, including aromatic and halogenated hydrocarbons, asbestos, diethyl-sulfate, benzyl-chloride, cadmium, trichloroethylene, and perchloroethylene, in the soap and perfume industry may be related to the observed excess risk.[17,25–28] In Sweden, estrogens were used in this industry from the 1950s to the early 1960s in the manufacture of cosmetic creams.[17]

Also of interest was the observation that butchers and meat processors had a 13% excess risk of prostate cancer, which was consistent with a previous report.[29] Occupational exposure to animal steroid hormones and possibly an increased dietary consumption of meat and animal fat have been proposed to explain the excess risk in this group.[9] The excess risk observed for pulp-grinders and cellulose workers is also consistent with a previous report and may be related to suspected carcinogens and bleaching agents used in the production of paper pulp.[4] Lime and chalk workers also had significantly elevated risks for prostate cancer; possible carcinogenic exposures among these workers include asbestos fiber dust, bitumen fumes, and wollastonite.[30–33]

The excess risks seen for leather workers, veterinarians, forest management workers, and breeders of fur-bearing animals are noteworthy because these classes of workers may have some exposures in common with farmers, including chemi-

cals, herbicides, insecticides, hormones, and zoonotic viruses.

Similar to previous studies,[13,14,34–39] we found a significant but small (<10%) excess risk of prostate cancer among farmers and other agricultural workers. Specific exposures that might contribute to the excess of prostate cancer among farmers and other agricultural workers are difficult to identify, because agricultural industries and occupations include many different types of jobs and because farmers are exposed to multiple suspected carcinogens, including pesticides, fertilizers, solvents, fuels and oils, dust, zoonotic viruses, microbes, and fungi.[35,40–42] Exposure to herbicides and insecticides has been suggested[35,37,41–44] and is supported by a weak but statistically significant dose-response relationship found between prostate cancer mortality in agricultural workers and the number of acres sprayed with herbicides.[45] Use of phenoxyacid herbicides and nitrate fertilizers has also been reported to increase the risk of prostate cancer.[35,41,45,46] In addition, similar to butchers and other meat processors, farmers and agriculture workers may have exposures to animal steroid hormones, which may increase their risk.

It is not clear whether lifestyle factors related to farming are also associated with the excess risk seen among farmers and other agricultural workers. In some instances, however, the agricultural lifestyle may explain a considerable proportion of the prostate cancer excess in certain geographical areas. Nearly 50% of the high rates among African-Americans in Southern states and over other regions of the country seems to be attributable to farming.[47] A diet high in fat has been linked to an elevated risk of prostate cancer.[48] Farmers and agricultural workers tend to have a high consumption of dairy products, eggs, meat, potatoes, and sugar and a lower intake of fruits and vegetables.[39] However, farmers have been found to have a significantly increased risk for prostate cancer even after adjustment for dietary factors.[36] In addition, farmers have higher levels of physical activity and energy expenditure, which have been linked to a lower risk of prostate cancer.[49–51] Large analytical studies among farmers with specific measurements of chemical exposures (including herbicides and fertilizers) and a detailed interview about diet, physical activity, and/or other lifestyle factors are needed to explain the slight but consistent excess risk seen among farmers and agricultural workers.

Several animal studies have suggested that cadmium is a prostate carcinogen.[52,53] In addition, cadmium has been classified as a human carcinogen (group 1) by the International Agency for Research on Cancer.[53] Cadmium is found in insecticides, superphosphate fertilizers, cigarettes, and metal foundries.[43] In our study, several occupations related to farming, tobacco, and metal foundries had elevated risks of prostate cancer, although no excess risk was found for other occupations and industries with high levels of cadmium dust exposure, such as miners and quarry workers, shop and construction metal workers (including sheet metal workers, platers, and machinists), or rubber workers.[12,52,54]

The elevated risks seen for white-collar occupations such as business executives, sales workers, literary and artistic workers, office workers, clerks, teachers, bookkeepers, cashiers, and secretaries are consistent with previous reports.[5,38,50,51,54] The observed elevated risks may be explained in part by the low levels of physical activity associated with such occupations. A low level of physical activity may be related to prostate cancer risk through androgen metabolism and sex hormone binding globulin concentrations[55,56] or to failure to stimulate immune responses that may prevent early tumor formation immune responses.[57] Analytical studies are needed to determine whether the observed association with white-collar occupations is due to differences in occupational physical activity, socioeconomic status, dietary patterns, or other lifestyle factors.

Limitations of the Swedish Cancer-Environment Registry preclude making causal inferences.[15] For instance, there was no direct information on some relevant risk factors, such as socioeconomic status, smoking, physical activity, and other environmental exposures, that affect cancer incidence, making controlling for confounding difficult. Only occupation and industry employment data for 1960 were available; there is no information on the duration of employment. However, because occupational changes are not very common in Sweden, the occupational category reported in the 1960 national census is likely to represent an individual's usual adult job classification.

Misclassification of job titles is likely but minimal, because a reinterview of a random sample from the 1960 national census revealed close agreement (95%) at the broad 1-digit level of coding, with somewhat less agreement for more specific 3-digit codes, and because only 1 percent of the cancer cases reported to the National Swedish Cancer Registry during the study period could not be linked in census data.[16] False matching of cancer cases to census information has been estimated to be less than 0.5%.[16] To control for the geographical variations in prostate cancer incidence and the regional differences between rural and urban distributions of the population that might have involved lifestyle as well as environmental factors, all SIRs were adjusted for region.[17,23] Because national law requires that all malignant tumors be reported to the National Cancer Registry in Sweden, case ascertainment in this study is nearly complete.[16] Although these limitations exist, their influence on the study results is likely to be small, and therefore the Swedish Cancer-Environment Registry provides data useful for relatively inexpensive hypothesis-generating studies.

Results from this large study suggest that occupation is unlikely to play a central role in prostate cancer etiology because the excess risks observed in this study are usually quite small (<10%). However, future analytical studies are needed to identify specific exposures related to the observed excess risk among farmers, white-collar workers, and certain other occupations and industries.

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Doctor Visits

If only we took as good care of ourselves as we do of our pets. According to a national survey of pet owners by the American Animal Hospital Association, 67% of respondents said that they take their pets to the veterinarian more often than they see their own physician.

—Schogol M. Personal Briefing. *Philadelphia Inquirer,* December 12, 1999, p E8.